



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/715,982

11/18/2003

Tsun-Neng Yang

1970-3

4895

7590

10/05/2004

John S. Egbert
Harrison & Egbert
7th Floor
412 Main Street
Houston, TX 77002

EXAMINER

QUASH, ANTHONY G

ART UNIT

PAPER NUMBER

2881

DATE MAILED: 10/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/715,982

Applicant(s)

YANG, TSUN-NENG, ET AL

Examiner

Anthony Quash

Art Unit

2881

pw

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 18 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 3/19/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ackley [4,534,314]. As per claim 1, Ackley [4,534,314] teaches a wafer cassette (70) capable of loading a plurality of wafers (15), a processing chamber (10) comprised of a base (12, in combination with 87), a cassette-transferring module (69) for moving the wafer cassette to a predetermined position, and a wafer-transferring module (83) for moving a wafer from the wafer cassette to the base. See Ackley [4,534,314] abstract, fig. 3, col. 3 lines 1-25, col. 5 lines 60-40, col. 7 line 5 – col. 8 line 45. However, Ackley [4,534,314] does not explicitly state that the device being an ion implanting device. Ackley [4,534,314] does however, teach that the device is for processing workpieces in a vacuum. It also teaches that the device can be used for ion implantation. See Ackley [4,534,314] abstract, fig. 3, col. 3 lines 1-25, col. 5 lines 60-40, col. 7 line 5 – col. 8 line 45, col. 11 lines 30-40. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made use the device/apparatus for ion implantation since it is implied by the specification that it can be used for processing workpieces in a vacuum where an ion implantation beam is used.

Claims 2-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ackley [4,534,314] in view of Nussupov [6,414,328]. As per claim 2, Ackley [4,534,314]

Art Unit: 2881

teaches all aspects of the claim except for explicitly stating the wafer cassette comprise a plurality of irradiation trays for loading the wafer. Nussupov [6,414,328] does teach the wafer cassette (100, 118, which are called target presentation units) comprising a plurality of irradiation trays (here the trays are called cassettes) for loading the wafer. See Nussupov [6,414,328] abstract, fig. 3, col. 5 line 55 – col. 6 line 30, and column 13. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the wafer cassette comprise a plurality of irradiation trays for loading the wafer in order to prevent damaging the wafer during transport from the cassette to the processing area.

As per claim 3, Ackley [4,534,314] teaches the implanting base comprising a guiding slot for guiding for guiding the wafer. See Ackley [4,534,314] fig. 3. However, it does not explicitly state that slot being used for guiding the irradiation tray. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have the implanting base be used for guiding an irradiation tray in order to prevent damage from occurring to the wafer during entry and exit of the wafer from cassette.

As per claim 4, Ackley [4,534,314] teaches an isolative sleeve (85), on which the base is positioned. See Ackley [4,534,314] fig. 3. However, Ackley [4,534,314] does not explicitly state that a current integrator be electrically connected to the base. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have a current integrator be electrically connected to the base in order allow one to measure the current going through the wafer during irradiation by an ion beam.

As per claim 5, Ackley [4,534,314] teaches the cassette-transferring module comprising a rack positioned on the wafer cassette, a gear functioning to drive the rack through rotation so as to move the wafer cassette forward, and a first stepping motor for driving the gear. See Ackley [4,534,314] abstract, fig. 3, col. 3 lines 1-25, col. 5 lines 60-40, col. 7 line 5 – col. 8 line 45, col. 11 lines 30-40.

As per claim 6, Ackley [4,534,314] teaches the cassette-transferring module further comprising a guiding chute (72,73) for guiding the moving direction of the wafer cassette. See Ackley [4,534,314] fig. 3.

As per claim 7, Ackley [4,534,314] teaches the wafer-transferring module comprising a push plate (83) for moving the wafer from the cassette to the base. See Ackley [4,534,314] fig. 3. However, Ackley [4,534,314] does not explicitly state a second stepping motor for driving the push plate. Instead Ackley [4,534,314] teaches an actuating cylinder (84) for driving the push plate (83). See Ackley [4,534,314] abstract, fig. 3, col. 3 lines 1-25, col. 5 lines 60-40, col. 7 line 5 – col. 8 line 45, col. 11 lines 30-40. Ackley [4,534,314] shows that the actuating cylinder (84) is an equivalent structure known in the art. Therefore, because these two driving/elevating means were art-recognized equivalents at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute stepping motor for actuating cylinder (84).

Claims 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ackley [4,534,314] in view of Berrian [4,980,562]. As per claim 8, Ackley [4,534,314] in teach all aspects of the claims except for explicitly stating an ion generator for

Art Unit: 2881

generating an ion beam, a mass analysis magnet positioned between the implanting chamber and the ion generator, a first multipole positioned between the mass analysis magnet and the implanting chamber, a deflection board positioned between the first multipole magnet and the implanting chamber, and a second multipole magnet positioned between the deflection board and the implanting chamber. Berrian [4,980,562] teaches an ion implanting apparatus comprising an ion implanting chamber (this is implied due to the description of fig. 3A and the fact that Berrian [4,980,562] states that system including the end station is evacuated), an ion generator (52') for generating an ion beam, a mass analysis magnet (54') positioned between the implanting chamber (80) and the ion generator (52'), a first multipole magnet (62', 64') positioned between the mass analysis magnet (54') and the implanting chamber. See Berrian [4,980,562] abstract, figs. 3-3A, col. 7 line 15 – col. 8 line 35. However, Berrian [4,980,562] does not explicitly state a deflection board being positioned between the first multipole magnet and the implanting chamber. Instead, Berrian [4,980,562] teaches a deflector (66') being positioned between the first multipole (62', 64') and the implanting chamber. See Berrian [4,980,562] abstract, figs. 3-3A, col. 7 line 15 – col. 8 line 35. Berrian [4,980,562] shows that deflector (66') is an equivalent structure known in the art. Therefore, because these two ion deflecting means were art-recognized equivalents at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute deflector in Berrian [4,980,562] for the deflection board in applicants' invention. Berrian [4,980,562] also teaches a second multipole magnet (72') positioned between the deflector (66') and implanting chamber. See

Berrian [4,980,562] abstract, figs. 3-3A, col. 7 line 15 – col. 8 line 35. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made an ion generator for generating an ion beam, a mass analysis magnet positioned between the implanting chamber and the ion generator, a first multipole positioned between the mass analysis magnet and the implanting chamber, a deflection board positioned between the first multipole magnet and the implanting chamber, and a second multipole magnet positioned between the deflection board and the implanting chamber in order allow the device to be used for implanting ions in wafer at very precise locations.

As per claim 9, Berrian [4,980,562] teaches all aspects of the claim except for explicitly stating that the second multipole magnet is a quadrupole magnet for adjusting the direction of the ion beam to be perpendicular to the surface of the wafer. Berrian [4,980,562] does however teach the second multipole magnet being a dipole magnet for adjusting the direction of the ion beam to be perpendicular to the surface of the wafer. See Berrian [4,980,562] abstract, figs. 3-3A, col. 7 line 15 – col. 8 line 35. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to make the second magnetic multipole a quadrupole in order to increase the field thereby the reducing deviations in the beam trajectory.

As per claim 10, Berrian [4,980,562] teaches a gated vacuum valve positioned between the implanting chamber and the ion generator (52'), and an extension tube (68') positioned between the implanting chamber and the gated vacuum valve. See Berrian [4,980,562] abstract, figs. 3-3A, col. 7 line 15 – col. 8 line 35.

Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Berrian [4,980,562]. As per claim 11, Berrian [4,980,562] teaches an ion implanting apparatus comprising an ion implanting chamber (this is implied due to the description of fig. 3A and the fact that Berrian [4,980,562] states that system including the end station is evacuated), an ion generator (52') for generating an ion beam, a mass analysis magnet (54') positioned between the implanting chamber (80) and the ion generator (52'), a first multipole magnet (62', 64') positioned between the mass analysis magnet (54') and the implanting chamber. See Berrian [4,980,562] abstract, figs. 3-3A, col. 7 line 15 – col. 8 line 35. However, Berrian [4,980,562] does not explicitly state a deflection board being positioned between the first multipole magnet and the implanting chamber. Instead, Berrian [4,980,562] teaches a deflector (66') being positioned between the first multipole (62', 64') and the implanting chamber. See Berrian [4,980,562] abstract, figs. 3-3A, col. 7 line 15 – col. 8 line 35. Berrian [4,980,562] shows that deflector (66') is an equivalent structure known in the art. Therefore, because these two ion deflecting means were art-recognized equivalents at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute deflector in Berrian [4,980,562] for the deflection board in applicants' invention. Berrian [4,980,562] also teaches a second multipole magnet (72') positioned between the deflector (66') and implanting chamber. See Berrian [4,980,562] abstract, figs. 3-3A, col. 7 line 15 – col. 8 line 35.

As per claim 12, Berrian [4,980,562] teaches all aspects of the claim except for explicitly stating that the second multipole magnet is a quadrupole magnet for adjusting

the direction of the ion beam to be perpendicular to the surface of the wafer. Berrian [4,980,562] does however teach the second multipole magnet being a dipole magnet for adjusting the direction of the ion beam to be perpendicular to the surface of the wafer. See Berrian [4,980,562] abstract, figs. 3-3A, col. 7 line 15 – col. 8 line 35. Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to make the second magnetic multipole a quadrupole in order to increase the field thereby the reducing deviations in the beam trajectory.

As per claim 13, Berrian [4,980,562] teaches a gated vacuum valve positioned between the implanting chamber and the ion generator (52'), and an extension tube (68') positioned between the implanting chamber and the gated vacuum valve. See Berrian [4,980,562] abstract, figs. 3-3A, col. 7 line 15 – col. 8 line 35.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. U.S. Patent Nos. 4,745,281 to Enge, 4,700,077 to Dykstra et al, 4,831,270 to Weisenberger, 6,614,027 to Iwasawa, 5,691,537 to Chen et al, and U.S. Patent Published Applications 2003/0001110 to Enge et al. Enge [4,745,281] is considered pertinent due to its disclosure of an ion source, mass analyzing magnet, first multipole magnets, deflection plates, second multipole magnets and a target. Dykstra [4,700,077] is considered pertinent due to its discussion on ion beam implanter control systems. Enge [2003/0001110] is considered pertinent due to its discussion on a system and method for amplifying an angle of divergence of a scanned ion beam.

Art Unit: 2881

Weisenberger [4,831,270] is considered pertinent due to its discussion on an ion implantation apparatus. Iwasawa [6,614,027] is considered pertinent due to its discussion on a method of controlling electrostatic lens and ion implantation apparatus. Chen [5,691,537] is considered pertinent due to its discussion on a method and apparatus for ion beam transport.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony Quash whose telephone number is (571)-272-2480. The examiner can normally be reached on Monday thru Friday 9 a.m. to 5 p.m..

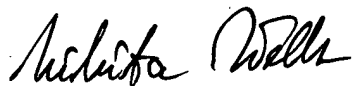
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John R. Lee can be reached on (571)-272-2477. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A. Quash



9/30/04


NIKITA WELLS
PRIMARY EXAMINER 09/30/04